



Critical Care Therapy and Respiratory Care Section

Category:	Clinical
Section:	Bronchial Hygiene
Title:	Incentive Spirometry
Policy #:	02
Revised:	3/00

1.0 DESCRIPTION

- 1.1. Definition: Incentive spirometry, also known as Sustained Maximal Inspiration (SMI), is a technique used to encourage a patient to take a maximal inspiration using a device to measure flow or volume. A maximal inspiration sustained over three seconds may increase the transpulmonary pressure thereby improving inspiratory volumes and inspiratory muscle performance. With repetition, and as part of an overall bronchial hygiene program, SMI maneuvers may reverse lung atelectasis and restore and maintain airway patency. The device used to facilitate SMI, the incentive spirometer, incorporates visual indicators of performance in order to aid the therapist in coaching the patient to optimal performance. Likewise, patients may use this visual feedback to monitor their own efforts.
- 1.2. Indications
 - 1.2.1 Conditions predisposing a patient to the development of atelectasis such as upper-abdominal or thoracic surgery, prolonged bed rest, surgery in patients with chronic obstructive pulmonary disease, a lack of pain control, or the presence of thoracic or abdominal binders.
 - 1.2.2 The presence of pulmonary atelectasis.
 - 1.2.3 Presence of a restrictive lung defect associated with a dysfunctional diaphragm or involving the respiratory musculature.
 - 1.2.4 Preoperative screening of patients at risk for pulmonary complications postoperatively: a baseline flow or volume may be obtained to aid in assessing the patient's postoperative function.

1.3 Contraindications

- 1.3.1 The patient cannot be instructed to ensure proper use of the device, or patient cooperation is absent or hindered. Developmental age may preclude the use of this technique in very young patients and others with developmental delays. A patient must be able to take a deep breath through the mouth *only* while maintaining a tight seal on the mouthpiece. Pediatric incentive spirometers should be used in the preadolescent age groups to encourage motivation and facilitate instruction. Additionally, instruction of parents, guardians, and other health care givers in the technique of incentive spirometry may help to facilitate the child's appropriate use of the technique.
- 1.3.2 The patient is unable to take a deep breath; the patient's vital capacity should be at least 10 mL/kg.

1.4 Precautions

- 1.4.1 The technique is inappropriate as the sole treatment for major lung collapse or consolidation.
- 1.4.2 Hyperventilation may result from improper technique.
- 1.4.3 There is potential for barotrauma in emphysematous lungs.
- 1.4.4 Discomfort may occur secondary to uncontrolled pain.
- 1.4.5 Development of bronchospasm may occur in susceptible patients. Close monitoring of patients with hyperreactive airways should be maintained.

2.0 EQUIPMENT

- 2.1 Incentive spirometer appropriate to age of patient (pediatric or adult)
- 2.2 Adapters if needed (e.g., for use with a tracheostomized patient)

3.0 PROCEDURE

- 3.1 Introduce oneself to the patient and assess the appropriateness of the therapy for the patient (See 1.2 through 1.4 above).
- 3.2 Describe the proper technique as well as the importance of adequate therapy for optimal bronchial hygiene. NOTE: A maximal inspiration should be sustained for a minimum of three seconds.

- 3.3 Perform a pre- and post-treatment assessment of breathing pattern, frequency, and lung sounds.
- 3.4 Position the patient for optimal therapy (as erect as possible without causing the patient's level of pain to increase).
- 3.5 Assist the patient while he/she performs 10 maneuvers. Encourage the patient to perform the technique independently with five to ten breaths per session every hour while awake.
- 3.6 Encourage the patient to cough during and after the session using optimal technique and effort.

4.0 POST PROCEDURE: Direct supervision and therapist interaction may be decreased after the patient has demonstrated proper performance of the task and if motivation is sufficient.

- 4.1 Supervision and monitoring should be performed intermittently (at least once daily) to include:
 - 4.1.1 Number of attempts per session
 - 4.1.2 Inspiratory volume achieved
 - 4.1.3 Effort/motivation and compliance

Chart these data in the MIS System under "Device assisted Tx"

- 4.2 An assessment of outcome should also be made. A positive outcome of incentive spirometry and criteria for discontinuance:
 - 4.2.1 Absence or resolution of atelectasis as shown by any of the following:
 - 4.2.1.1 A decreased respiratory rate
 - 4.2.1.2 The absence of fever
 - 4.2.1.3 Absence or abolition of crackles and improved aeration of lung units
 - 4.2.1.4 Improving chest radiograph
 - 4.2.1.5 Attainment of preoperative flow and volume levels
 - 4.2.1.6 Increased forced vital capacity

Perform therapy including proficiency with the spirometer and mobility of patient. Monitoring by the Respiratory Care Staff will be discontinued when all the above criteria are met.

5.0 REFERENCES

- 5.1 AARC Clinical Practice Guideline “Incentive Spirometry”
- 5.2 AARC Clinical Practice Guideline “Directed Cough”

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